Modified Early Warning Score (MEWS) Value in the Intensive Care Unit

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Modified Early Warning Score (MEWS) Value in the Intensive Care Unit

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This presentation describes a case-control quantitative research study which examined the effects a modified early warning score (MEWS) had as a cardiac arrest event predictor in an adult ICU. Use of a MEWS tool demonstrated beneficial outcomes in its ability to enhance current treatment initiatives aimed at cardiac arrest event prevention.

Evidence

In published literature, the goal for Rapid Response Teams (RRTs) to decrease cardiac arrest events is inconsistently met. The author's personal 7-year experience with an RRT in a 1,080-bed tertiary hospital aligned with the literature in that it did not achieve a significant reduction in cardiac arrest events.

Contrasting evidence shows the use of some type of an early warming score yields positive outcomes in cardiac arrest prevention.

Study Purpose

Examine the effects of a modified early warning score (MEWS) tool as a cardiac arrest indicator.

Setting

32 bed Level 1 adult Medical-Surgical Intensive Care Unit (M/SICU) within a 1,080-bed tertiary care Magnet® Hospital.

Population

Patients >age 18 admitted to the M/SICU 7/1/2011 -- 12/31/2012

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Tool

MEWS scores calculated on admission and at 4-hour intervals for the first 24 hours of an ICU stay.

MEWS Score Tool
Used with Permission of Stony Brook University Hospital, Stony Brook, NY

Score	3	2	1	0	1	2	3
Heart Rate/minute		<40	40-50	51-100	101-110	111-129	>130
Systolic Blood Pressure	<70	71-80	81-100	101-159	160-199	200-220	>220
Respiratoary Rate/minute		<8		9-17	18-20	21-29	>30
Level of Consciousness	Unresponsive	Responds to pain	Responds to voice	Alert	Agitation or confusion	New onset agitation or confusion	
Temperature		<95.0°	95.1°-96.8°	96.9°-100.4°	100.5°-101.3°	>101.4°	

Independent data and MEWS score validation were completed to ensure accuracy of data collection and MEWS score values.

Methodology

Research Design

Case-control method using retrospective medical record review

Study Sample

Matched during identical time frame by age and gender

- ***Case sample*** – 45 subjects who experienced cardiac arrest during ICU stay
- ***Control sample*** – 45 subjects who did not experience a cardiac arrest

Results

Research Question #1 - What differences exist between case and control group subjects exhibiting a MEWS score of 5 or greater at least once in the first 24 hours of an ICU stay?

MEWS Score > 5 At Least Once	Yes	No
CASE GROUP	30	15
Highest Score	11	4
Average Number of Times Score >5	3	Not Applicable
CONTROL GROUP	19	26
Highest Score	10	4
Average Number of Times Score >5	2	Not Applicable

McNemar's Test Results	Control Group	Matched control with at least one MEWS score >5 in first 24 hours of ICU stay	Matched control with no MEWS score >5 in first 24 hrs of ICU stay
CASE GROUP			
Case Group with at least one MEWS score >5 in first 24 hrs of ICU stay		13	17
Case Group with no MEWS score >5 in first 24 hrs of ICU stay		6	9
Exact Significance = 0.035			

Statistical analysis using a McNemar's test revealed a significant difference between the proportion of case and control group members exhibiting at least one MEWS score of 5 or greater in the first 24 hours of an ICU stay measured at the 0.05 level. These outcomes provide the foundation for the rejection of hypothesis one's null hypothesis and support of alternative hypothesis. Additional outcomes from the linear regression analysis reveal that the MEWS scores of the case groups was 1.2263 higher at each time interval that those of their matched control subjects. The determined difference between the MEWS scores of the case and control groups indicates the case group members have higher MEWS scores and a larger proportion of case samples possess at least one MEWS score of a 5 or greater during their first 24 hours of admission.

Research Question #2 - What deleterious changes in respiratory rate occur within eight hours prior to a cardiac arrest event?

MEWS Respiratory Scores -- Case Group Only (n=45)	Score 1 (Immediately before Cardiac Arrest)	Score 2 (4 hours before Cardiac Arrest	Score 3 (8 hours before Cardiac Arrest)
Number of Cases with Score	45	42	38
Score Range	0-3	0-3	0-3
Mean Score	1.38	1.60	1.13
Standard Deviation	1.248	1.127	0.991
Median Score	1.0	2.0	1.0
Mode Score	0	2	0

Wilcoxon Signed -- Rank Test Results		N	Mean Rank	Sum of Ranks
MEWS Respiratory Rate Score 4 hours compared to immediately before Cardiac Arrest (Score 2:Score 1)	Negative Ranks	8	9.25	74.00
	Positive Ranks	11	10.55	116.00
	Tie Ranks	23		
	Total Ranks	42		
MEWS Respiratory Rate Score 8 hours compared to immediately before Cardiac Arrest (Score 3:Score 1)	Negative Ranks	17	13.29	226.00
	Positive Ranks	9	13.89	125.00
	Tie Ranks	12		
	Total Ranks	38		
MEWS Respiratory Rate score 8 hours compared to 4 hours before Cardiac Arrest (Score 3:Score 2)	Negative Ranks	18	12.86	231.50
	Positive Ranks	6	11.42	68.50
	Tie Ranks	14		
	Total Ranks	38		

Wilcoxon Signed -- Rank Test Statistics	Score 2:Score 1	Score 3:Score 1	Score 3:Score 2
Z Score	-0.880	-1.314	-2.456
Significance	0.379	0.189	0.014

Conduction of the Wilcoxon signed-rank test comparing the case groups' MEWS respiratory rate score parameter values immediately, four, and eight hours prior to a cardiac arrest event indicated a statistically significant change at the 0.05 level. The outcome of this analysis provides the foundation for the rejection of the second null hypothesis and support of the corresponding alternative hypothesis. Findings from this investigation indicate that worsening respiratory changes occur between 4 and eight hours prior to an experienced cardiac arrest event, answering research question two.

Implications

- Use of MEWS score offers standard language to predict cardiac arrest.
- Newer software associated with EMRs automatically calculates MEWS score, alerting clinicians to emergent patient decline.